

REMARKS

Claims in the case are 14, 16-18 and 25-28, upon entry of this amendment. Claims 14, 16-18 and 25 have been amended, no claims have been added, and Claim 24 has been cancelled without prejudice herein.

Claim 15 was cancelled without prejudice in an amendment dated 7 September 2005. Claim 23 was cancelled without prejudice in an amendment dated 16 May 2005. Claims 19 and 20 were cancelled without prejudice in an amendment dated 10 January 2005. Claims 1-13, 21 and 22 were cancelled without prejudice in previous amendments.

Claim 14 has been amended herein to include closed-end transitional language (i.e., "consisting of") after the preamble. Claim 14 has been further amended herein to optionally include the subject matter of Claim 24. Accordingly, Claim 24 has been cancelled, and Claim 25 has been amended to change its dependency from "Claim 24" to --Claim 14--. Claims 14, 16, 17 and 18 have been amended herein to replace "sintering aids" with --sintering aid--. The amendments to the claims are not deemed to represent the entry of new matter into the case.

Claims 14-18, 24 and 25 stand rejected under 35 U.S.C. § 102(a or e) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as being obvious over United States Patent No. 5,804,523 (**Oda et al**), United States Patent No. 5,885,916 (**Tajima et al**) or United States Patent No. 5,998,319 (**Hintermayer**), each taken alone. These rejections are respectfully traversed with regard to the amendments herein and the following remarks.

Oda et al disclose a sintered product of silicon nitride that includes: at least 70 mole percent of beta-silicon nitride; a Group 3a element that at least includes Lu; and impurity oxygen in the form of SiO₂. See the abstract, and column 2, lines 44-60 of Oda et al. In addition, Oda et al teaches that the oxynitride content of the silicon nitride material is not critical. See column 4, lines 1-20 of Oda et al.

On page 3 of the Office Action of 28 September 2005 (which is incorporated into the Final Rejection of 18 January 2006), it is argued that Oda et al "teach a silica to rare earth ratio of up to 3.8." Applicants respectfully disagree, and respectfully submit that Oda et al actually disclose a ratio of SiO₂ to RE₂O₃ of 1.6 to

10, 1.6 to 3.5 and 1.6 to 2.7. See column 2, lines 44-60, and column 4, lines 60-64 of Oda et al.

Tajima et al disclose a dielectric material having a low dielectric loss factor for high frequency use, that includes a sintered product of silicon nitride containing: oxygen as an impurity in the form of SiO_2 ; a Group 3a element; and less than or equal to 2 percent by weight of aluminum in the form of aluminum oxide. See column 3, lines 18-28 of Tajima et al.

On page 3 of the Office Action of 28 September 2005 (which is incorporated into the Final Rejection of 18 January 2006), it is argued that Tajima et al "teach a [silica to rare earth] ratio of up to 3.5." Applicants respectfully disagree, and submit that Tajima et al actually disclose a ratio of SiO_2 to RE_2O_3 of 1.5 to 10 and 1.8 to 3.5. See column 4, lines 45-50 of Tajima et al.

Hintermayer discloses a sintered silicon nitride that includes: silicon nitride; and 5 to 20 percent by weight of a glass component (e.g., SiO_2 or Al_2O_3), which originally had a particle size of less than 2 micrometers. See the abstract, and column 1, lines 62-67 of Hintermayer.

On page 3 of the Office Action of 28 September 2005 (which is incorporated into the Final Rejection of 18 January 2006), it is argued that Hintermayer "teach a glass having greater than 65% silica," with reference to the table at column 3 thereof. Applicants respectfully submit that the Examiner's remarks in this regard are taken out of context, are not consistent with what Hintermayer actually teaches, and as such do not extend to or otherwise touch upon the silicon nitride material of Applicants' present claims. The glass disclosed in the table at column 3 of Hintermayer is merely a component from which Hintermayer's disclosed sintered silicon nitride is prepared, and does **not** include a silicon nitride component.

On page 2 of the Final Rejection of 18 January 2006, it is argued that Applicants' claimed ratio of SiO_2 to (SiO_2 + sintering aid) is converted to "1.8 to 2.85" when "sintering aids other than SiO_2 " are included or considered. Applicants respectfully disagree. Applicants' present claims recite closed-end transitional language, which is exclusive of sintering aids other than those recited. As such, the argument presented on page 2 of the Final Rejection is deemed to be moot.

Oda et al, Tajima et al and Hintermayer, either alone or in combination do not disclose, teach or suggest a silicon nitride material according to Applicants' present claims: (i) that includes a sintering aid consisting of only Al_2O_3 and Y_2O_3 ; (ii) in which SiO_2 , Al_2O_3 and Y_2O_3 are present in the boundary phase; (iii) in which the ratio of (SiO_2) to $(\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Y}_2\text{O}_3)$ is from greater than 0.65 to 0.74 (e.g., 0.72 or 0.74); (iv) that has a silicon oxide nitride content of less than 1 percent by weight; and (v) that has a porosity of less than 0.5 percent by volume. In addition, Oda et al, Tajima et al and Hintermayer, either alone or in combination, do not disclose, teach or suggest a silicon nitride material according to Applicants' present claims that has a mass loss of less than or equal to 0.3 mg/cm^2 when immersed in HCl at a temperature of 60°C for 500 hours.

The unique and unexpected properties of the silicon nitride material of Applicants' present claims is demonstrated with reference to Examples 1a through 1d, and 2a through 2c, as summarized in Table 1 on page 9 of the specification. Those silicon nitride materials according to the present invention (i.e., as represented by Examples 1b, 1c, 2b and 2c) provide a mass loss of less than or equal to 0.3 mg/cm^2 when immersed in HCl at a temperature of 60°C for 500 hours. For purposes of illustration, Comparative Example 2a has an (SiO_2) to $(\text{SiO}_2 + \text{Al}_2\text{O}_3 + \text{Y}_2\text{O}_3)$ ratio of less than 0.65 (i.e., of 0.30), and a 60°C HCl immersion weight loss of 10 mg/cm^2 at 100 hours, and 16 mg/cm^2 at 500 hours. Examples 1b, 1c, 2b and 2c, which are representative of Applicants' presently claimed silicon nitride material have 60°C HCl immersion weight loss values of less than or equal to 0.3 mg/cm^2 at 100 hours and 500 hours. For purposes of quantitative comparison (with regard to the 60°C HCl immersion for 500 hours), the mass loss of the silicon nitride material of Comparative Example 2a (10 mg/cm^2) is 69.6 time greater than that of Example 2b (0.23 mg/cm^2), which is according to the present invention.

On page 3 of the Office Action of 28 September 2005 (which is incorporated into the Final Rejection of 18 January 2006), it is argued that Applicants' discussion of unexpected results is not persuasive for want of comparative examples that approximate the compositions of Oda et al, Tajima et al and Hintermayer. Applicants respectfully submit that in light of the amendments herein and the preceding remarks, the compositions of the cited references do not reasonably

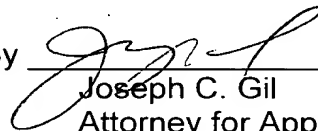
extend to or otherwise touch upon the silicon nitride material of Applicants' present claims. As such, the mass loss of Applicants' claimed silicon nitride material after immersion in HCl, and the discussion thereof with reference to the examples of Applicants' specification is deemed to reasonably represent an unexpected and unique property thereof.

In light of the amendments herein and the preceding remarks, Applicants' claims are deemed to be unanticipated by, and unobvious and patentable over Oda et al, Tajima et al and Hintermayer. Reconsideration and withdrawal of the present rejection is respectfully requested.

In light of the amendments herein and the preceding remarks, Applicants' presently pending claims are deemed to define an invention that is unanticipated, unobvious and hence, patentable. Reconsideration of the rejections and allowance of all of the presently pending claims is respectfully requested.

Respectfully submitted,

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